

June 11, 1968

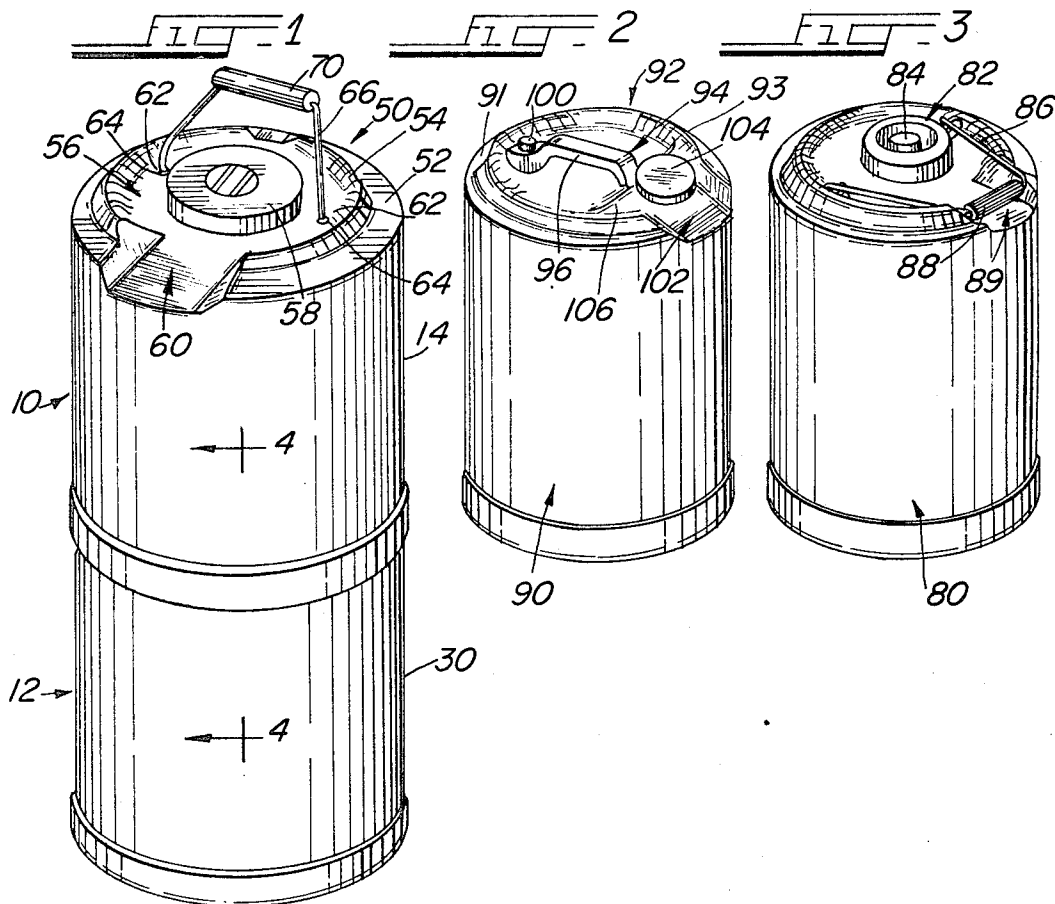
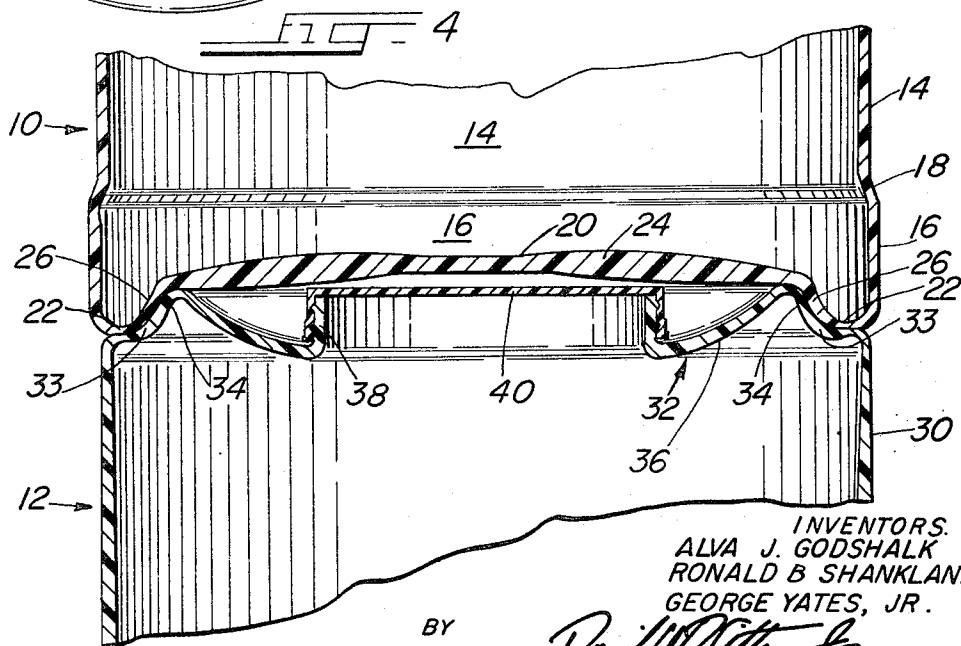
A. J. GODSHALK ET AL

3,387,749

PLASTIC CONTAINERS

Filed Oct. 6, 1966

2 Sheets-Sheet 1



INVENTORS.
ALVA J. GODSHALK
RONALD B. SHANKLAND, SR.
GEORGE YATES, JR.

BY

David W. Little
FILL

June 11, 1968

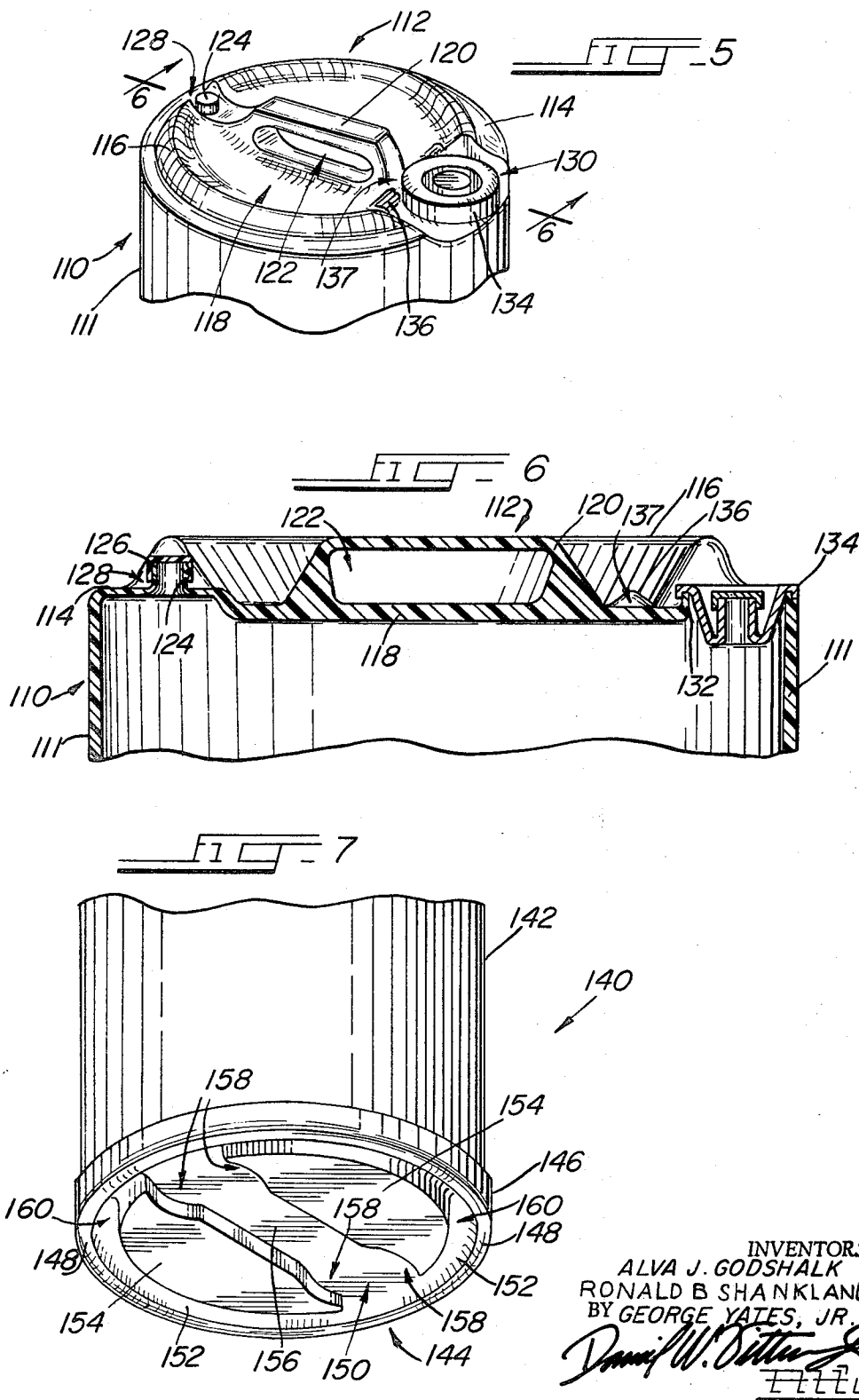
A. J. GODSHALK ET AL

3,387,749

PLASTIC CONTAINERS

Filed Oct. 6, 1966

2 Sheets-Sheet 2



INVENTORS.
ALVA J. GODSHALK
RONALD B. SHANKLAND SR
BY GEORGE YATES, JR.

David W. Yates, Jr.

1

3,387,749

PLASTIC CONTAINERS

Alva J. Godshalk, Ozena, Fla., Ronald B. Shankland, Sr., Manteno, Ill., and George Yates, Jr., Glendale, Calif., assignors to Bennett Industries, Inc., Peotone, Ill., a corporation of Delaware

Filed Oct. 6, 1966, Ser. No. 534,891

6 Claims. (Cl. 222-143)

ABSTRACT OF THE DISCLOSURE

An improved container is formed of a synthetic plastic resin material and comprises a generally cylindrical side wall structure and integrally formed bottom wall and top wall structures. The bottom wall structure is joined, adjacent its outer edge, to the bottom edge of the side wall structure to form an annular bearing surface adjacent the periphery of the side wall. A center portion of the bottom wall structure is concave upwardly and is adapted to accommodate various members located on a top wall structure of an adjoining container when the containers are in a stacked relationship. The bottom wall also includes an integrally formed annular inclined surface arranged between the bearing surface and center portion of the bottom wall structure at an angle displaced from a vertical plane. The top wall structure includes an upwardly extending, generally annular bead adjacent a shoulder portion thereof, and a center portion which is concave downwardly from the top edge of the bead. The bearing and inclined surfaces of the bottom wall structure are complementary with the shoulder and annular bead portions of the top wall structure. As a result, when a first container is vertically stacked on top of a second such container, the bead and shoulder portions of the lower container come with the inclined and bearing surfaces, respectively, of the top container. When the containers are stacked in the manner described, the placement of the comated bead portion and inclined surface resist lateral movement of the containers, and the weight of the top container is placed directly over the side wall structure of the lower container.

The present invention relates to plastic containers and more particularly to a unitary self-supporting molded plastic shipping container of about 2-10 gallon capacity.

The advantages of fabricating a shipping container from plastic rather than conventional metals, such as steel, are obvious. A plastic container suitable for shipping and storing fluids, such as liquids and semi-liquids, would be more economical than a similarly sized metal container by reason of the comparatively higher cost of conventionally utilized metals (such as steel) in relation to plastics (such as polyethylene). Moreover, problems of corrosion, which often arise with metal containers, could be avoided since plastics are generally more resistant than metals to corrosion and other similar forms of attack. Additionally, the effective substitution of plastic for metal in a commercial shipping container could yield significant economies with respect to the weight of the resultant container.

However, the use of synthetic materials such as plastics for the fabrication of shipping containers has long been impeded by the lack of strength and durability exhibited

2

by a molded plastic container relative to prior art metal containers. While composite containers comprising metal or fiber outside overpacks and plastic liners have permitted some of the advantages of modern synthetic materials (such as corrosion resistance, for instance) such composite containers have nonetheless exhibited a number of the disadvantages of the prior art metal containers (e.g., weight, cost, and the like).

Some attempts have been made to substitute synthetic plastic resin materials for the prior art metals in connection with containers of relatively small size, e.g., containers of up to about one gallon. However, when efforts have been made to formulate containers of larger size from such synthetic materials, substantial difficulty has been encountered, i.e., such containers have been unsatisfactory from the standpoint of strength and resistance to the handling shocks.

It is, therefore, a primary object of the present invention to provide a new and improved unitary molded plastic shipping container having a capacity in the range of about 2-10 gallons.

Another object of the present invention is to provide a container of the character described which is relatively strong and resistant to wear and which may be used without a supporting overpack.

A further object of the present invention is to provide containers of the character described which may be conveniently stacked in vertical columns, one upon the other.

A still further object of the present invention is to provide a shipping container of the character described in which large radial changes in direction are provided, thereby greatly limiting molding stresses and objectionable thinning and, therefore, providing a container which is exceptionally strong and capable of successfully withstanding shipping and handling hazards (e.g., internal and external pressures and rough handling) and which is resistant to cold flow when loaded.

These and other objects, advantages, and features of the present invention will hereinafter appear and, for purposes of illustration, but not of limitation, exemplary embodiments of the present invention are shown in the accompanying drawings, in which:

FIGURE 1 is a side perspective view of one embodiment of the present invention showing two containers stacked, one upon the other;

FIGURE 2 is a side perspective view of another embodiment of the present invention;

FIGURE 3 is a side perspective view of still another embodiment of the present invention;

FIGURE 4 is a fragmentary sectional view taken substantially along line 4-4 in FIGURE 1;

FIGURE 5 is a fragmentary perspective view of still another embodiment of the present invention;

FIGURE 6 is a fragmentary sectional view taken substantially along line 6-6 in FIGURE 5; and

FIGURE 7 is a fragmentary perspective view of one form of container bottom in accordance with the present invention.

Briefly, the present invention is a container integrally formed of a synthetic plastic resin material and comprising a generally cylindrical side wall structure, a portion of the side wall structure adjacent the lower edge thereof being offset outwardly slightly; a bottom wall structure joined adjacent its outer edge with the bottom edge of

the side wall structure thereby to form an annular bearing surface, the center portion of the bottom wall structure being concave upwardly, an annular inclined surface being integrally formed between the bearing surface and the center portion of the bottom wall structure; and a top wall structure joined at its periphery with the top edge of the side wall structure thereby to form a generally annular shoulder, the top wall structure including an upwardly extending generally annular bead adjacent the shoulder portion thereof, the center portion of the top wall structure being concave downwardly, the bearing surface and inclined surface of the bottom wall structure being complementary with the shoulder and annular bead of the top wall structure, whereby a first one of such containers is vertically stackable on top of a second one of such containers with the bearing surface of the said first container distributing the weight of the said first container directly over the side wall structure of the said second container.

With reference to the drawings, FIGURE 1 shows a pair of containers 10, 12 stacked, one above the other. Containers 10 and 12 are substantially identical and are molded from synthetic plastic resin material, preferably from polyolefinic material, such as high density ethylene copolymers and polyethylene. Especially satisfactory resins in accordance with the present invention fall within ASTM classification Type III, Class A, Grade A Resins. Conventional molding techniques (e.g., blow molding) may be employed to produce the containers of the novel design hereinafter described.

The structure of containers 10 and 12 can best be appreciated from the FIGURE 4 cross sectional view thereof. As shown in FIGURE 4, container 10 comprises a generally cylindrical side wall structure 14, a lower portion 16 of which is offset outwardly slightly for a purpose that will hereinafter appear. Portion 16 and the main portion of side wall structure 14 are interconnected by an annular shoulder 18. Container 10 further comprises a bottom wall structure 20 which is joined at its periphery with lower portion 16 of side wall structure 14, thereby forming a bearing surface 22. A center portion 24 of bottom wall structure 20 is concave upwardly for a purpose that will hereinafter appear. Center portion 24 and bearing surface 22 are interconnected by an annular inclined surface 26.

Container 12 comprises a side wall structure 30 and a top wall structure 32 which is joined at its periphery with side wall structure 30. The joinder of top wall structure 32 and side wall structure 30 is such that a generally horizontal annular shoulder 33 is formed along the periphery of top wall structure 32, and an upwardly extending annular bead 34 is molded integrally with shoulder 33. The respective surfaces of shoulder 33 and bead 34 cooperate complementarily with bearing surface 22 and inclined surface 26 to permit containers 10, 12 to be vertically stacked (see especially FIGURE 1). The complementary interrelationship between shoulder 33 and bead 34 and bearing surface 22 and inclined surface 26 can best be appreciated from the cross sectional view shown in FIGURE 4 of the drawings. As shown in FIGURE 4, the various surfaces cooperate to permit an upper container to be readily positioned for stacking relative to a lower container.

The center portion 34 of top wall structure 32 is concave downwardly as shown in the drawing for a purpose that will hereinafter appear. An upwardly projecting, annular neck flange 38 is formed in center portion 36, and a conventional closure 40 is threaded thereon in a manner well known to those skilled in the art. The upper edge of closure 40 projects upwardly into the space formed in concave center portion of bottom wall structure 20 as shown in FIGURE 4.

As mentioned above, containers 10 and 12 are substantially identical such that container 10 additionally comprises a top wall structure 50 that is identical to top

wall structure 32 of container 12. Top wall structure 50 thus comprises an outer annular shoulder 52 which is joined to side wall structure 14. An upwardly projecting bead 54 is provided in top wall structure 50 inwardly of the annular shoulder 52, and a downwardly concave center section 56 is provided in the center portion of top wall structure 50. A conventional closure 58 is threaded to a neck flange (not shown).

Bead 54 and shoulder 52 are interrupted and cut away at 60 in order to permit liquid to drain from within the concave central section 56 of the top wall structure. In addition, a pair of webs 62 are molded within concave central section 56, each web 62 being provided with an opening 64. The ends of a conventional wire bail 66 project through openings 64, and a handle grip 70 is provided on bail 66. Thus, bail 66 is pivotable between a raised carrying position (see FIGURE 1) and a lowered rest position. FIGURE 3 shows a similar container with its handle grip disposed in a lowered rest position, as described hereinafter in detail. Thus, the bail 66 and handle grip 70 do not interfere with the stackability of the container. Container 12 likewise has a cut away portion for drainage purposes in the top wall structure and is provided with appropriate carrying handle means, although the same are not shown in the drawings.

In general, the walls of the containers produced in accordance with the present invention have thicknesses of at least about 45 mils. However, due to the inherent characteristics of blow molding techniques, walls of uniform thickness cannot be achieved. In particular, the top wall structure, bottom wall structure, and side wall structure of the containers tend to accumulate more material than do the corner areas wherein the different wall structures are interconnected. In order to obtain a container exhibiting the desired strength characteristics, it is preferred that mold design and programming techniques be employed such that the containers of the present invention have additional material molded at the points of intersection between the various wall structures. FIGURE 4 illustrates generally the relative thicknesses that are employed through a container produced in accordance with the present invention. While FIGURE 4 indicates that the bearing surface 22 of container 10 and the shoulder 33 of container 12 are somewhat thinner than the respective thicknesses of wall structures 14, 20, 30, nonetheless, the thicknesses of the wall structures at key points have been built up relative to the thicknesses that would ordinarily be achieved with a container of the instant design produced via a conventional blow molding technique. In particular, the mold design and programming techniques are employed so as to achieve a thickening (relative to that which would ordinarily be achieved) of container 10 from the point of intersection of side wall structure 14 with annular shoulder 18, through wall portion 16, bearing surface 22, and inclined surface 26 (i.e., throughout the overall area adjacent the intersection between side wall structure 14 and bottom wall structure 20). Likewise, container 12 is thickened throughout the area adjacent the intersection of side wall structure 30 and top wall structure 32. Thus, the wall structures are thickened (relative to what would ordinarily be achieved) throughout annular shoulder 33, and annular bead 34.

Additional material is also provided along either side of the part line (i.e., the mold line formed on the container at the point at which the two halves of the molding die meet). Typically, this mold or part line takes the form of a line formed by the intersection of a plane passing vertically through the center of the container. The molding of additional plastic material along the part line prevents a weak spot or spots from being formed in the container wall along such part line. Typically, additional material is provided up to forty-five or ninety radial degrees on either side of the part line.

By means of the thickening of the containers at the indicated points, an especially strong, sturdy, stackable

plastic shipping container may be obtained. Although the various points at which the walls are thickened (relative to that which would ordinarily be achieved) are still somewhat thinner than the other portions of the container, the additional thickness is sufficient to impart the desired characteristics to the container.

FIGURES 2, 3, and 5-7 show modified arrangements of the container of the present invention. These containers are substantially the same in structure and operation as containers 10, 12, but different handle members and closure arrangements are provided in the top wall structures thereof.

A container 80 is shown in FIGURE 3. Container 80 is substantially identical to containers 10, 12, except that the projecting flanged opening in the center of the top is of smaller diameter than are the center openings in containers 10, 12. A closure member 82 is threaded or crimped to the flanged opening. A preferred closure fitting embodies a push-pull pour spout 84 of the type shown in Smith U.S. Patent No. 3,040,938. When in shipping and storage condition, spout 84 is depressed in the position shown in FIGURE 3. However, as set forth and described in the aforesaid U.S. patent, the flexible pour spout 84 may be pulled upwardly into a pouring position when it is desired to discharge the contents of the container. As previously mentioned, handle means, including a wire bail 86 and hand grip 88, is shown in the lowered rest position 89 of the top wall structure.

In FIGURE 2, a container 90 is shown in which a top wall structure 92 thereof comprises an annular shoulder 91 and an annular bead 93. Top wall structure 92 has molded in a concave center section 94 thereof an integrally molded plastic handle member 96. The rearward end of handle member 96 terminates adjacent bead 93, and a vent opening, provided with a closure 100, is provided in the rearward portion of handle member 96. The shoulder 91 and bead 93 are cut away at 102 to provide for drainage, and an upwardly projecting neck flange (not shown) is molded directly in front of handle member 96, partially in the downwardly concave center section 94 and partially in the cut away section 102. A conventional closure cap 104 may be attached to the flanged opening, or, a push-pull type spout of the type previously described may advantageously be provided in combination therewith. A rib 106 is molded in the concave center section 94 in order to impart greater strength to the container. Rib 106 is provided substantially perpendicularly to handle member 96 adjacent its forward end (i.e., the end adjacent closure 104) and extends substantially across section 94, with its ends terminating adjacent the inner surface of bead 93.

An especially preferred embodiment of the present invention is illustrated in FIGURES 5 and 6. A container 110 is provided with a generally cylindrical side wall 111 and a top wall structure 112 having a generally horizontal shoulder 114 and an upwardly extending bead 116. A downwardly concave center section 118 is provided inwardly of bead 116 as in the case of the other described embodiments. An integrally molded plastic handle member 120 having an opening 122 provided therein is provided along a diameter of the container 110. A flanged vent opening 124 with an associated closure cap 126 are provided in a cut away portion 128 of bead 116 as best shown in FIGURE 6. A cut away portion 130 is provided in bead 116 at the opposite end of handle member 120, and a flanged outlet opening 132 (see FIGURE 6) is provided in interrupted portion 130. A push-pull type closure 134 of the type shown in Smith U.S. Patent No. 3,040,938 is attached to flanged opening 132. The outer edge of closure 134 is substantially aligned with the periphery of the top wall structure 112.

The positioning of the opening 132 and closure 134 closer to the periphery of the top wall structure 112 in many instances provides for a superior utility in discharging the contents of the container. Also, the cut away por-

tion 130 is inclined downwardly slightly in order to permit drainage of spilled material from the concave center section 118. Moreover, as best shown in FIGURE 6, the top of closure 134 is preferably aligned with shoulder 114 so that a substantially continuous surface is provided on which the bearing surface of another such container may rest when the containers are stacked.

A rib 136 [similar to previously described rib 106 in container 90 (see FIGURE 2)] is provided in order to further strengthen the container. Rib 136 is generally perpendicular to the longitudinal direction of handle member 120 and extends between opposite portions of bead 116 between handle member 120 and closure 134. A depression 137 is molded in the center of rib 136 in order to permit liquid to drain from the center of top wall structure 112.

A modified version of the bottom wall structure of the container of the present invention is shown in FIGURE 7, in which a container 140, having a generally cylindrical side wall structure 142 and a bottom wall structure 144, is illustrated. A lower portion 146 of side wall structure 142 is offset outwardly slightly for reasons that will hereinafter appear. Bottom wall structure 144 is joined at its periphery with lower portion 146, thereby forming a bearing surface 148. A center portion 150 of structure 144 is concave upwardly, center portion 150 and bearing surface 148 being interconnected by an annular inclined surface 152.

For reasons that will hereinafter appear, a pair of bearing members 154 are molded in the center portion 150 of bottom wall structure 144. The bottom surface of bearing surfaces 144 is essentially aligned with bearing surface 148 so as to effect a more equal distribution of the container weight when stacked. The bearing members 154 do not merely comprise additional material grafted onto the bottom wall structure; instead, members 154 are molded therein so as to increase slightly the capacity of the container. An annular groove 160 is thus formed between bearing members 154 and bearing surface 148. When stacked, the annular bead (e.g., bead 116 shown in FIGURES 5 and 6) fits snugly into groove 160.

Bearing surfaces 150 serve to define a generally rectangular trough 156 designed to fit over the handle member (such as member 120 shown in FIGURES 5 and 6) when the containers are stacked. Radially indented portions 158 are provided in bearing surfaces 154 adjacent the ends of trough 156 in order to permit the closure (e.g., closure 134 shown in FIGURES 5 and 6) of a lower container to be received upwardly without disrupting the regular stackability of the containers. The top of trough 156 is designed to contact the upper surface of the handle means (such as handle means 120 in FIGURES 5 and 6) and thus provides an additional load bearing surface. The trough 156 is preferably disposed at substantially right angles to the handle member (e.g., member 120) on such a container so that, when stacked, the closures of the containers will not be vertically aligned. This provides for a more sturdy and stable stacked container configuration, and locks the stacked containers against relative rotational movement.

The containers thus described are novel, unitary molded plastic devices. Relatively large radial changes in direction are provided between the various wall structures of the containers and, as a result, superior molding characteristics are obtained. The lack of narrow, irregular shapes, recesses, or projections results in a container that may be more satisfactorily and economically molded from polyolefinic materials. Likewise, the novel arrangement of cooperating surfaces embodied in the shoulder and bead of the top wall structure, together with the bearing and inclined surfaces of the bottom wall structure, produce stackable containers which may be quickly and simply positioned one above the other for shipping and/or storing purposes. In particular, the complementary sur-

faces permit a rapid positioning of the containers for stacking.

The outwardly offset lower portion of the side wall structure of the container (i.e., portion 16 of container 10) effects a distribution of the weight of the upper container (via the bearing surface of the bottom wall structure) directly over the side wall structure of the lower container, an arrangement that permits the containers to be stacked without undue strain being placed upon the lower container, that is, the weight of the upper container acts directly downwardly over the side wall structure of the lower container. In addition, the inwardly concave central portions of the top and bottom wall structures cooperate with the side wall structure to provide an extremely strong container. When such containers are stacked in a loaded condition, the side wall structure flexes slightly inwardly in a parabolic fashion, thereby further contributing to the strength of the container and its resistance to crushing under heavy static loading conditions.

The plastic containers produced in accordance with the present invention have capacities in the range of about 2 to about 10 gallons and are of sufficient strength to withstand static loading of 600 to 800 pounds without objectionable distortion, a condition not achievable with prior art blow-molded plastic containers. Likewise, internal pressure such as hydrostatic loads of as great as 15 pounds p.s.i. may be applied for 5 to 7 minutes without the container rupturing. Likewise, rough handling of the container, such as by dropping a filled container from a distance equaling the height of a truck tailgate onto a solid concrete surface does not result in a rupturing of the container. Finally, the generally concave nature of the center sections of the top and bottom wall structures permit the handle or other carrying means and closures to be compactly and conveniently provided without impairing the stackability of the containers.

As previously mentioned, a particularly useful arrangement is obtained through the use of a push-pull type pouring spout of the type described in the aforesaid Smith U.S. Patent No. 3,040,938, whereby, when it is desired to discharge the contents of the container, the spout may be pulled upwardly, its cover cap removed, and the contents conveniently poured from the container or a part thereof, and, when the discharge operation is completed, the cover cap may be replaced and the spout pushed downwardly into condition. However, any number of different closure arrangements and combinations may be provided depending upon the specific use for which the container is intended, and, as will be obvious to one skilled in the art, the flanged opening may be modified so as to accommodate such fittings. Any excess liquid that may collect in the concave section of a container top wall structure may be easily poured away therefrom through a cut away portion in the shoulder and annular bead.

The specific configuration of the concave top and bottom wall sections, whereby a slight inward flexing of the side wall structure is obtained, together with the complementary surfaces which permit containers to be vertically stacked, permits a highly satisfactory unitary, self-supporting molded plastic shipping container of 2-10 gallon capacity to be achieved.

While the invention has been specifically shown and described in what is believed to be the most practicable and preferred embodiments, it should be understood that various changes, modifications, and deviations from the structure and operation of the present invention as described herein may be made without departing from the spirit and the scope of the appended claims.

What is claimed is:

1. A container integrally formed of a synthetic plastic resin material comprising:

a generally cylindrical side wall structure, a portion of

the side wall structure adjacent the lower edge thereof being offset outwardly slightly;

a bottom wall structure joined adjacent its outer edge with the bottom edge of the side wall structure thereby to form an annular bearing surface,

the center portion of the bottom wall structure being concave upwardly,

an annular inclined surface being integrally formed between the bearing surface and the center portion of the bottom wall structure;

a top wall structure joined at its periphery with the top edge of the side wall structure thereby to form a generally annular shoulder,

the top wall structure including an upwardly extending generally annular bead adjacent the shoulder portion thereof,

the center portion of the top wall structure being concave downwardly,

the bearing surface and inclined surface of the bottom wall structure being adapted to comate with the shoulder and annular bead of the top wall structure;

an elongated handle member in the center portion of the top wall structure; and

a pair of bearing members molded in the center portion of the bottom wall structure, the lower surfaces of said bearing members being generally aligned with the annular bearing surface, the said bearing members cooperating to define therebetween a generally rectangular trough into which the handle member of another of such containers is receivable when such containers are stacked,

the handle member on the top wall structure and the trough formed by the bearing members on the bottom wall passing through the respective centers of the top and bottom wall structures, said handle member and said trough being disposed at right angles to one another,

whereby a first one of such containers is vertically stackable on top of a second one of such containers so that: the inclined surface of the first container comates with the annular bead of the second container; the bearing surface of the first container comates with the annular shoulder of the second container; the handle member of the first container is received within the rectangular trough of the second container; and the weight of the first container is distributed directly over the side wall structure of the second container.

2. A container, as claimed in claim 1, wherein the side, top, and bottom wall structures are of a one-piece blow-molded construction wherein the areas at which the said wall structures are joined are relatively thickened and wherein the said wall structures are thickened adjacent a mold line formed by the mold in which said container is blow-molded.

3. A container, as claimed in claim 2, wherein the synthetic plastic resin material is an ethylene copolymer.

4. A container, as claimed in claim 2, wherein the synthetic plastic resin material is polyethylene.

5. A container, as claimed in claim 1, wherein the handle member takes the form of an integrally molded, raised, longitudinally disposed member forming, in cooperation with the center portion of the top wall structure, a handle opening, the said container further comprising:

a drainage depression molded in the generally annular bead in order to provide a cut away drainage portion of the top wall structure;

an upwardly extending annular neck flange in the top wall structure defining an opening therein,

said neck flange being positioned adjacent the periphery of the top wall structure and one end of the handle member and located at least in part in the drainage depression of the top wall structure;

venting means provided in a second cut away portion

9

of the upwardly extending bead adjacent the other end of the handle member; and
closure means detachably connectable to the neck flange in order to close the opening in the top wall structure.
6. A container, as claimed in claim 1, and further comprising:
a strength-imparting rib molded in the center portion of the top wall structure between the neck flange and the handle member and generally perpendicular to the longitudinal dimension of the handle member, the ends of said rib terminating adjacent the upwardly extending bead.

5

10

10

References Cited

UNITED STATES PATENTS

D. 206,245	11/1966	Platte	-----	D58—17
D. 206,410	12/1966	Platte	-----	D58—17
1,746,332	2/1930	Barroll	-----	220—97
3,045,871	7/1962	Henrickson	-----	222—143
3,214,052	10/1965	Dike	-----	215—10
3,270,922	9/1966	Schmidt	-----	222—143
3,288,342	11/1966	Tinker	-----	220—97 X

ROBERT B. REEVES, *Primary Examiner.*
N. L. STACK, *Assistant Examiner.*